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ABSTRACT

The Stanford Research International (SRI) classroom observation system provides a description of the classroom environment with emphasis on interactions between teachers and students and among students. Included in the SRI observation system is the Five Minute Observation (FMO), which records classroom interactions into "frames" completed four times per hour describing "who" performed the observed action, "to whom" it was directed, and "what was done." While this system provides an excellent picture of the classroom, the amount of information provided is overwhelming. A method was developed for reducing the amount of data to be analyzed. FMO data from observations of nine second-grade classrooms was categorized by combinations of "who" and "to whom" codes found to occur most frequently. These categories were further divided into teacher-initiated and student-initiated interactions. It was felt that this system of categorization captured the major classroom interactions and excluded information of little educational value. A teacher profile created on the basis of categorical FMO can provide a basis for discerning the effects of various teaching styles on student behavior. (JD)

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Reducing and Combining Classroom Observation Categories into Behavioral Profiles

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Research and Development Center
for Teacher Education

The University of Texas at Austin

Report No. 5088

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Reducing and Combining Classroom Observation
Categories into Behavioral Profiles

R.M. Kerker & R.O. Clements

The central focus of the Dimensions of Classroom Instruction project (DCI) is two-fold. First, the project is concerned with the comparison, evaluation, and integration of data collection techniques utilized by field researchers in the classroom. The second major concern is constructing a comprehensive picture of the classroom environment. The content area of reading instruction and its relationships to teacher techinques and individual student perceptions and abilities is the area of particular examination.

Findings from this dual-focused approach will be of particular interest to researchers concerned with the implications of using different methods of classroom observation. Additionally, teachers and administrators concerned with effective teaching of reading will benefit from the findings provided by the project.

To achieve these goals, data from a year-long study of second grade reading groups, including ethnographic records, videotapes, and a quantitative classroom coding system are being analyzed. The relationships among these various types of information are currently being explored.

The focus of the current paper is the analysis of data from the Stanford Research International (SRI) observation system (Stallings & Kaskowitz, 1974) in order to determine how it can best be utilized to discern patterns of interaction among students and teachers. The SRI classroom observation system was developed to provide a description of the classroom environment with emphasis on interactions between teachers and students as well as among students themselves. This observation system is comprised of several sections,

but the Five Minute Observation (FMO) is of particular interest to this study. The FMO records classroom interactions into "frames" completed four times per hour. There are four codes comprising each frame describing who performed the observed action, to whom it was directed, and what was done. Additionally, there are a number of modifiers which indicate whether an interaction could be further categorized by other modifiers (e.g., punishment, organizing, or touching). In essence, each frame is a sentence with a noun, verb, object, and optional modifier.

Although this system provides an excellent picture of the classroom, the amount of information provided is overwhelming. In the relatively small sample of data collected in the current study, 40,000 frames were coded. With the exclusion of modifiers, this represents 120,000 separate codes which must be considered during data analysis. This enormous amount of data can decrease the efficiency of obtaining logical and inclusive conclusions regarding classroom behavior. Further, this system lends itself to a variety of analysis approaches which may focus on small units of classroom behavior, yet fail to produce a clear overall picture of the classroom environment. How then can this observation system be optimally used to describe classroom behavior? One method which can be employed by the researcher is to develop a techinque for reducing the amount of data to be analyzed without losing critical information and focusing on an overall picture of classroom behaviors. Such a method is proposed in this paper. It is believed that through creating teacher "profiles" on the basis of categorical FMO codes, the researchers can obtain an accurate picture of the classroom which is easily interpretable and which provides a solid basis for discerning the effects of various teaching styles on student classroom behaviors.

Method

Sample

The sample for this investigation consisted of nine second grade classrooms in two small school districts. Four of these classrooms were in a rural district with an ethnically mixed population. The remaining five classes were from a district which was composed of a predominately white, suburban population. Complete data were obtained for approximately 219 students from these schools. As a whole, the sample included students from high, medium, and low socioeconomic status families. The nine teachers who participated in this study represented a range of teaching backgrounds from no prior experience to nine years of experience.

The focus of the classroom observations was reading instruction. Observation began in late November, 1978, and continued through the remainder of the school year. Each classroom was observed during the reading instruction period by both a classroom coder and an ethnographer ten times throughout the year. Each of the observations lasted for ninety minutes. Additionally, for each classroom, three of the ten observations were also videotaped.

Observation System

The observation system chosen for this study was one developed by the Stanford Research Institute for use in the evaluation of the national Follow Through programs (Stallings & Kaskowitz, 1974). This system was developed to provide a description of the classroom environment, a record of classroom activities, the interactions between teachers and children, and the interactions among children themselves. This instrument was especially designed to detect differences in instructional methods, interpersonal interactions, and classroom environments.

The SRI instrument consists of six distinct sections which code information concerning identification of tne class, number of students and adults present in the classroom, physical environment, classroom activities, focus of the observation, and categorization of interactions. As mentioned previously, the section of the SRI system which was of considerable interest for this investigation was the Five Minute Observation (FMO). This section is used to record and categorize classroom interactions of groups and individuals. The FMO records interactions into "frames" of behavior four times per hour. There are four categories comprising each frame describing who performed the action (teacher, student, small group, etc.), to whom it was directed (teacher, student, small groups, etc.), and what the action was (command, question, response, praise, no response, etc.). Additionally, there are a number of optional modifiers with which a coder can indicate whether an interaction was academic or behavioral, verbal or non-verbal, and whether the interaction could be further categorized by other modifiers such as "organizing," "warmth," "punishment," or "touching." These coded frames form what essentially are "sentences" consisting of a noun (who), an object (to whom), a verb (what), and an optional modifier. An FMO record, then, is a series of frames or "sentences" which describe classroom interactions.

A coder used in a previous study and a housewife who responded to a newspaper advertisement served as SRI coders. A week of intensive training was provided by an expert SRI coder who had worked with the authors of the system. Reliability was assessed at the end of training by having the expert and the two trainees view a videotape of classroom interaction. The expert's codes were accepted as a standard, and a count was made of the number of times the trainees' "who," "to whom," "what," and "how"

codes agreed with the standard. Using this method, 92.4% of one trainee's codes and 93.2% of the other's codes were found to agree with the expert's. This was considered a satisfactory level of agreement to allow the trainees to go into the field.

Generalizability theory (Cronbach, Gleser, Nanda and Rajaratnam, 1972) was used to further assess the reliability of the coders. During the spring of the study, two of the teachers in the sample were observed by both of the coders. The FMO data from the first hour of these two observations, consisting of four, five-minute observations, were used for the generalizability analysis. The design was a four-facet design involving coders, teachers, observations, and categories on the FMO. This was a fully crossed design, and all variables were considered random. The "who," "to whom," "what," and "how" sections of the FMO were analyzed separately since each section is coded independently within a frame. The frequencies of each of the codes within each of these sections for each of the five-minute observations served as the unit of analysis.

The facet of interest consisted of the FMO categories in each section. The purpose of the analysis was to determine the dependability of these category frequencies generalized across the remaining facets (coders, teachers, and observations). The generalizability for one category coded by one observer on one teacher during one five-minute observation was found to be .96, .64, .51, and .83 for the "who," "to whom," "what," and "how" sections, respectively. However, these coefficients do not truly represent the generalizability of the scores which would be used for comparison with the ethnographic data. The coefficients reported above represent the generalizability of scores obtained during <u>one</u> five-minute observation. The scores of interest, however, are the frequencies

obtained by summing across all observations throughout the school year. Since data were obtained for approximately 60 five-minute observations for each teacher, the generalizability coefficients should be based upon 60 observations, rather than one observation. Cronbach, et al. provide formulas for estimating generalizability for a given number of levels of a facet, much as the Spearman-Brown Prophecy formula estimates the reliability of a test for a given number of items. Using these formulas, the estimated generalizabilty coefficients for these aggregate frequencies were .99, .98, .94, and .99 for the four sections of the FMO. Thus, the evidence suggests that the frequency data from the year's observations were quite reliable.

Results

Reducing the FMO Data

Many different combinations of the "who," "to whom," "what," and "how" codes are likely to occur using this coding system. In order to obtain manageable profiles of classroom behaviors and interactions, these data were reduced to a relatively small number of categories. As a first step in the data reduction, a simple count of the unique frames which occurred out of the approximately 42,000 frames obtained was made. A "unique frame" was a combination of the four types of codes which differed from all other combinations of codes. Out of the 42,000 frames, 610 unique frames were identified. About one-third of these unique frames occurred only once, and nearly half of the unique frames occurred three times or fewer. Only 12% occurred 100 times or more, and only 2% occurred 1,000 times or more. It became apparent from this frequency analysis that many of the unique frames occurred very infrequently. However, there were also a large number of unique frames which occurred fairly often, too many,

in fact, to be dealt with individually as the basis for classroom profiles. It was necessary to combine frames into a limited number of categories that would summarize the data without losing any important information.

Because of the great flexibility of the FMO, there are a number of possible ways in which categorization can be achieved. The category system used in this investigation was designed to meet the following criteria: (1) it divided the "pie" of classroom behavior into logical units similar to the ones found in many observation systems, (2) most of the created categories occurred with fairly high frequency in at least some of the nine classrooms observed, and (3) it utilized a large proportion of the data.

The category system developed for this study was hierarchical in nature and consisted of two levels of categorization. On the top level major categories were created and subsequently subdivided on the second level. The major categories were created from combinations of "who" and "to whom" codes which were found to occur most frequently. This system, then, categorized interactions according to who initialized the behavior and to whom it was directed. These categories were further divided into teacher-initiated and student-initiated interactions. The teacher-initiated categories were: teacher-initiated individual interactions, teacher-initiated large group interactions, teacher-initiated small group interactions and teacher-initiated non-instructional behaviors. The student-initiated categories included: student-initiated individual interactions, large group initiated interaction, and small group initiated interactions. These major categories were further subdivided into numerous subcategories. This procedure categorized 94% of the total frames. It was felt that this

system of categorization captured the major classroom interactions which occurred and that the excluded information was of little educational value (such as, teacher starts tape recorder).

Figure 1 shows a profile for one of the nine teachers. The format of these profiles is similar to one used by Stallings, Needels, and Staybrook (1979). On the left-hand side of the profile is listed each category and the subcategories contained within it. On the far right-hand side are two sets of percentages, one pertaining to the sample of nine teachers as an aggregate, the other to the teacher of interest. The teacher categories and the student categories were treated separately in computing these percentages. The percentages for the major teacher categories reflect the percentage of the total teacher-initiated frames which fell into the category. Thus, the percentage for "T initiated individ. interact. -- Total" indicates the percentage of the total teacher-initiated interactions which were directed towards an individual student. Similarly, "S initiated interactions -- total" indicates the percentage of the total student-initiated interactions which were initiated by a single student. All of these percentages were calculated separately for the sample as a whole and for the teacher of interest, and are listed under the "sample ave." and "this class" columns. The difference between these two figures indicates the degree to which the individual classroom displayed a high or low amount of the behavior. The graph on each figure shows this difference.

In Figure 1, for example, 53.9% of the sample's teacher-initiated interactions were directed towards an individual student, while 58.0% of Teacher 8's interactions were student directed. Since Teacher 8 was relatively high on this behavior, and "X" was placed on the right side of

the deviation axis to show that the teacher was approximately four percentage points above the sample average on this category. An "X" to the right of the zero point indicates a relatively high amount of the behavior, an "X" to the left indicates a relatively low amount of the behavior, while an "X" in the middle indicates an average amount of the behavior, relative to the sample of nine teachers. On the next major category, "S initiated interaction -- total," the class average of 84.5% differed from the sample average of 80.5% by 4.0 percentage points. Therefore, an "X" has been placed under the 4.0 point on the axis.

The percentages for the subcategories were computed in the same manner, except that their percentages were computed relative to their respective categories. In Figure 1, it can be seen that for the sample 17.5% of the total teacher-initiated individual interactions were in the "T command or request" category, while Teacher 8 made commands or request in 24.6% of her interactions directed towards individual students.

The percentages and the deviations in percent indicate the relative number of frames involving the category, and loosely reflect the amount of time devoted to these categories. It is very important to realize that these percentages were computed in a hierarchical fashion. The major teacher categories reflect the proportion of total teacher time spent in each category, while the student categories were computed in terms of total student-initiated frames. The subcategories were computed in terms of the total number of category frames. One can examine, for example, a teacher's behavior towards individuals as opposed to large or small groups. Likewise one can compare students' behavior in groups with their behavior as individuals. From this information, one can begin to make inferences

about the ways in which teachers and students interact in various classroom contexts.

Other categorizations are available on the teacher profiles. On the bottom of the second page of each profile, all categorized interactions, whether student or teacher initiated, are broken down as academic, behavioral, or other. Academic interactions are those related to strictly academic matters (i.e., reading or spelling). Behavioral interactions indicate interactions involving behavioral corrections. Other task-oriented interactions include non-academic interactions such as procedural interactions and incidental conversations.

Page 3 of the profiles concerns affectively charged events. Because these events were rare, their occurrence was expressed in frequency rather than percent. It can be seen in Figure 1, for example, that for the sample as a whole, punishment occurred only 1.3 times out of the 10 observations, while three instances of punishment were observed for Teacher 8. The deviation graph for these events reflects the difference in frequency between the class and the sample average.

A great deal of information about the teachers can be gleaned from each of these profiles. With a little experience, one can infer a picture of the classroom by comparing percentages and frequencies in the various categories and subcategories.

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Figure 1

INTERACTION PROFILE FOR TEACHER 08 (PAGE 1 OF 3)

VARIABLE NAME	PERCENT DEVIATION FROM SAMPLE AVERAGE (<2 <0 | 1 5 | 1 0 | 0 5 | 0 0 | 0 5 | 1 0 | 1 5 | 2> 0>)	PERCENT SAMPLE AVG.	PERCENT THIS CLASS
T INITIATED INDIVID. INTERACT. -- TOTAL		53.9	58.0
T COMMAND OR REQUEST		17.5	24.6
T DIRECT QUESTION		21.9	13.7
T RESPONSE		9.2	4.2
T INSTRUCT., EXPLANATION -- VERBAL		9.1	6.1
T INSTRUCT., EXPLANATION -- NONVERBAL		3.2	9.6
T TASK RELATED COMMENTS		4.1	2.9
T ACKNOWLEDGMENTS		12.9	8.8
T PRAISE		2.3	1.9
T CORRECT. OR GUIDANCE -- ACADEMIC		12.3	21.2
T CORRECT. OR GUIDANCE -- BEHAVIORAL		4.5	4.4
T OBSERVING OR LISTENING		3.1	2.4
S INITIATED INTERACTIONS -- TOTAL		80.5	84.5
S QUESTIONS		12.7	4.3
S VERBAL RESPONSE -- ACADEMIC		49.5	44.8
S NONVERBAL RESPONSE -- ACADEMIC		11.4	12.3
S BEHAVIORAL RESPONSE		3.7	3.9
S READING ALOUD		17.8	32.5
S NO RESPONSE OR DON'T KNOW		4.9	2.3
T INIT. LARGE GROUP INTERACT. -- TOTAL		19.6	17.6
T COMMAND OR REQUEST		19.3	22.0
T DIRECT QUESTION		19.6	25.7
T INSTRUCT., EXPLAN. -- VERBAL		34.4	26.7
T INSTRUCT., EXPLAN. -- NONVERBAL		1.9	0.0
T TASK RELATED COMMENTS		2.0	.5
T ACKNOWLEDGMENTS		1.9	3.8
T CORRECTS. OR GUIDANCE -- BEHAVIORAL		3.8	2.8
T OBSERVING OR LISTENING		17.1	18.4

VARIABLE NAME	PERCENT DEVIATION FROM SAMPLE AVERAGE (<2 <0 | 1 5 | 1 0 | 0 5 | 0 0 | 0 5 | 1 0 | 1 5 | 2> 0>)	PERCENT SAMPLE AVG.	PERCENT THIS CLASS
LARGE GROUP INITIATED INTERACT, -- TOTAL		10.8	9.5
LG. GRP. VERBAL RESP, -- ACADEMIC		48.6	52.5
LG. GRP. NONVERBAL RESP. -- ACADEMIC		42.8	41.0
LG. GRP. BEHAVIORAL RESPONSE		4.6	6.0
LG. GRP. CHORAL RESP.		4.0	.5
T INIT. SMALL GROUP INTERACT, -- TOTAL		11.3	7.9
T COMMAND OR REQUEST		26.3	32.8
T DIRECT QUESTION		25.4	29.5
T INSTRUCTION OR EXPLANATION		31.1	14.6
T ACKNOWLEDGMENT		2.5	4.5
T CORRECT. OR GUIDANCE -- ACADEMIC		2.1	1.9
T CORRECT. OR GUIDANCE -- BEHAVIORAL		2.4	4.1
T OBSERVING OR LISTENING		10.2	12.7
SMALL GROUP INITIATED INTERACT, -- TOTAL		8.7	5.9
SM. GRP. VERBAL RESP, -- ACADEMIC		48.1	51.1
SM. GRP. NONVERBAL RESP. -- ACADEMIC		45.5	48.9
SM. GRP. READING ALOUD		6.3	0.0
T NON-INSTRUCTIONAL BEHAV, -- TOTAL		15.2	16.5
T WALKING AROUND ROOM		9.9	25.9
T ENGAGED IN PAPERWORK		90.1	74.1
TOTAL INTERACTIONS		100.0	100.0
TOTAL ACADEMIC		78.2	75.8
TOTAL BEHAVIORAL		3.8	3.7
TOTAL OTHER TASK-ORIENTED		18.1	20.5

INTERACTION PROFILE FOR TEACHER 08 (PAGE 3 OF 3)

VARIABLE NAME	DEVIATION FROM SAMPLE AVERAGE: LESS FREQ <2.5	1.5–1.0	1.0–0.5	AVG 0.5–0.0	0.0–0.5	MORE FREQ 0.5–1.0	1.0–1.5	>1.5	FREQUENCY: SAMPLE AVG.	THIS CLASS
T INIT. HAPPY INTERACTIONS				X					4.0	3.0
S INIT. HAPPY INTERACTIONS			X						8.1	3.0
T INIT. UNHAPPY OR NEG. INTERACT.								X	15.8	42.0
PUNISHMENT				X					1.3	3.0
TOUCH (NEGATIVE)					X				1.8	5.0